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ABSTRACT

This issue is divided into three sections: (1) British Science Activities; (2) Overseas Science Activities; and (3) International Science Activities. Presented in a newsletter format are many items of interest to science and mathematics educators. Included are materials on: (1) Nuffield science, (2) evaluation, (3) college science courses, (4) conferences on science and mathematics education, (5) activities in India, Africa, the Caribbean and Malaysia, and others. (RH)

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Science Education Newsletter

Issued by the
Education and Science Division
The British Council

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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The following were omitted from the list in SEN 31:

KENYA:	Senior Curriculum Specialist (Chemistry)	–	M A Ratcliffe
LESOTHO:	Science Advisory Officer National Teacher Training College Maseru	–	D J Hitchcock

ACTIVITIES IN BRITAIN

1. THEMES FOR THE MIDDLE YEARS – THE NEW NUFFIELD COMBINED SCIENCE

The original Nuffield Combined Science Project (Organizers C D Bingham and M J Elwell) was intended for children of all abilities, aged about eleven to thirteen. Its stated aims suggested that the work could lead into O-level courses in biology, chemistry, and physics, whether Nuffield or non-Nuffield, to Schools Council Integrated Science or other integrated science projects, or to Nuffield Secondary Science or any CSE or project work. It was envisaged that about three hours a week should be allocated to the work, arranged in units to suit the school timetable.

The **Activities** were designed so that children should have the opportunity of working in different ways through class, demonstration and circus investigations. The opportunity was fully taken to call on children's own experiences outside the classroom, as starting points to the work. A general aim was to produce a source of ideas, information and comment which would allow teachers to devise their own course. The **Teachers' guides** contain explicit procedures for carrying out experiments, as well as teaching notes whose particular examples express the philosophy underlying the Project.

Since the publication of Nuffield Combined Science in 1970, however, changes in the pattern of schooling in many parts of the country have affected the organization of science teaching for children of this age group.

During 1971/72, the Nuffield Foundation set up an investigation, under the direction of C D Bingham and M J Elwell, into the use of Combined Science in the middle schools. Following this survey, and with renewed demands from teachers for additional materials, a Continuation Project was established in 1974.

It was decided that one way of meeting the request for materials suitable for less able children or in mixed ability classes would be the production of cards (rather than books), each dealing with a complete topic, for use by pupils. Several groups of teachers throughout the country had already produced materials in connection with individual learning in science, often based on the original Nuffield Combined Science **Activities.**

Trials of materials were conducted in a wide variety of schools, in 1974 and 1975

The new materials will be published by Longman under the title Nuffield Combined Science **Themes for the Middle Years.**

They will consist of individual cards, to be called **Study cards** and **Activity cards.** There will be four Study cards to each Theme, and each Study card will have four associated Activity cards.

A set of Teaching Notes will accompany each Theme. There are six Themes in the first batch to be published. The titles will be:

Estimating and measuring
Sorting
Colour
Movement
Water
Out of doors.

The second batch of six titles will be:

Senses
Flowers
Air
Structures
Ourselves
Plastics

Later batches will include Themes on:

Heating things, Forces and fuels, Metals, Insects, Communications, What is in the air?, Food, Clothes, Patterns in movement, Light, Electricity, Using electricity.

2. BRITISH COUNCIL COURSE – CURRICULUM DEVELOPMENT IN SCIENCE: STRATEGIES AND TRENDS, 5 – 24 September 1977

During the decade from 1964 to 1974 large scale revisions of science curricula were implemented in the United Kingdom. The school education systems of England and Scotland differ in many ways, and their development was on different, though parallel, lines. In the last few years the moves towards "comprehensive" schools and "mixed ability" classes have introduced new factors. Attempts to bring about changes in syllabus content and methods of presentation have focussed attention on the problem of redefining the purpose and structure of the curriculum, identifying the constraints on change, forecasting trends and designing strategies.

The course will provide an opportunity to discuss these problems, and the social and administrative contexts in which they occur. The broad aims of the course will enable members to acquire:

1. a better understanding of the reasons for introducing changes to the curriculum in science
2. a deeper knowledge of the factors and organisations which can affect and effect curriculum change
3. a fuller appreciation of the various forms of evaluation and assessment and their use
4. a greater ability to devise strategies for curriculum change
5. an awareness of current trends in curriculum development in science
6. some understanding of the English and Scottish solutions to the problems of curriculum development and innovation.

The course will be in two parts. Part 1 will last for 9 days, and will be based at the Centre for Studies in Science Education, University of Leeds. Work will be organized around a number of themes which will relate to aspects of curriculum development, irrespective of the educational system in which it is undertaken. The themes will be:

Techniques of curriculum analysis
The learner's point of view
Subject imperatives
Managing curriculum change
The curriculum in action
Monitoring curriculum change
Teachers of science.

There will be opportunities for course members to contribute on aspects of science curriculum reform in their own countries.

Part 2 will be held at the College of Education, Dundee. This part of the course will include these themes:

1. Curriculum change in science education
2. On-going curriculum development – exemplified by the Scottish integrated science course.
3. Support for curriculum development.

The fee for this residential course is £400 inclusive. Application forms may be obtained from Representatives of the British Council, or where there is no Representation from: Courses Department, The British Council, 65 Davies Street, London W1Y 2AA.

3. BRITISH SCIENCE EDUCATION – A course at Manchester Polytechnic, 4 – 15 July 1977

BRITISH SCIENCE EDUCATION is planned as an integrated programme of activities which aims at giving insights into the workings of our science education system. It has been organised as a collaboration between the Faculties of Education and Science and Technology, and the Centre for Science and Technology Education of the Manchester Polytechnic.

The course will include: talks from some of the most distinguished science educators in Britain, visits to schools where, hopefuliy, teaching and learning can be witnessed in an unedited form; discussions with some of the decision-makers in British education; opportunities to see some innovations in teacher education and training; the chance to see some of Britain's scientific and technological heritage; plus of course the country itself.

The course aims to provide opportunity for our overseas counterparts to acquaint themselves with how we respond to our society's imperatives for science education. The organizers will not simply provide this perspective on the system but also offer first-hand experience of many of its aspects. The debate that will naturally follow will be of benefit to all.

Programme

The programme will offer a basic framework of activities centred on themes of common interest and also options which can be tailored to suit the interests of individual participants. The themes covered will be:

The System and those who affect it –
The Schools, Higher and Further Education, National and Local Government, The Examination Boards, The Schools' Council.

The Nature of Science Education in the Schools –
Primary and Secondary Science Education, Science for University Entrance. The last decade of Curriculum Reform.

The Education and Training of Science Teachers –
Undergraduate Education. The Certificate of Teachers, In-Service Education and Training.

Some Recent Developments –
Science for All, Science for Citizenship, Non-streamed and Independent Learning.

The optional part of the programme will be arranged in consultation with each participant. However, in anticipation of some likely interests, the organisers have prepared for requests in the traditional science subjects, integrated science, environmental science, schools technology, technician education, low cost science education and teacher controlled curriculum development.

Venue

The Manchester Polytechnic, formed in 1970 by an amalgamation of several nationally known colleges, is rapidly becoming a major centre for higher education. In 1976 it has over 6,000 full-time and an equal number of part-time students following a wide range of degree and diploma courses. Its facilities are to a large extent grouped within the Manchester Education Precinct, an ambitious development which also embraces the University of Manchester, its Institute of Science and Technology and its Business School, and the Royal Northern College of Music. This Precinct is only a few minutes drive from the University of Salford, and together these institutions form the largest educational complex in Europe.

Costs

The cost of attendance, which includes fee and full room and board, is SUS270. A deposit of S25 is required on registration.

For further details, contact Dr Brian J Brough, the Secretary, Science Education Workshop, John Dalton Faculty of Technology, Manchester Polytechnic, Chester Street, Manchester M15GD, England. Tel: 061-236 7784 Extension 270.

The closing date for applications is 1 March 1977. Late applications will be considered if received soon after that date.

4. SCOTTISH CENTRE FOR MATHEMATICS, SCIENCE AND TECHNICAL EDUCATION (SEN 23.15, 25.16, 26.4, 27.17, 28.10)

In Scotland there are 4 Centres which have been established to coordinate curriculum development in various subject areas. The Centres issue a Joint Newsletter, of which No 3, dated January 1976, is obtainable from the Secretary, Scottish Centre for Modern Languages, 69 Hilton Place, Aberdeen, AB9 1FA.

The Centre which deals with science education is the Scottish Centre for Mathematics, Science & Technical Education (SEN 23.15). The Centre shares a site and supporting services with the Dundee College of Education, Gardyne Road, Broughty Ferry, Dundee, DD5 1NY.

The main functions of the Centre, previously listed in SEN 23.15, are:

1. the collection and dissemination of information on curricular developments, primarily in Scotland but also internationally;

2. the development of teaching resources, in support of particular projects and to provide a general service to Scottish schools;

3. curriculum development and experiment, and cooperation with local centres and teachers' groups throughout Scotland.

The Centre does not have a direct in-service training role, as this is undertaken by Colleges of Education and Local Education Authorities.

The main publications of the Centre, in support of its functions, are:

1. a set of Bulletins which contain articles of general interest concerning science and mathematics education;

2. a set of Memoranda, each dealing with a specific theme;

3. Occasional Papers;

4. a series of Newsletters "Mathematics for the Least Able, 11–14".

Publications in the above series which have not previously been listed in SEN are as follows:

1. Bulletin No 6, price 25p;
   Bulletin No 7, price 25p;

2. Memorandum No 18: Electrostatics for Certificate of Sixth Year Studies, 32p;

3. Memorandum No 19: Nature of Chemical Reaction, 25p;

4. Memorandum No 20: Modern Mathematics and its Implications for Physics Teaching, 27p;

5. Occasional Paper No 2: Mathematics for General Education, a discussion document, 30p;

6. Mathematics for the Least Able, 11–14, a series of 10 Newsletters.

The work of the Centre is confined to the secondary education level. Among its current projects, one of great importance is the recent establishment, by the Scottish Central Committee on Mathematics, of a Working Party on Mathematics for the Less Able Pupils in S1 and S2. This Working Party intends to use the series of Newsletters "Mathematics for the Least Able, 11–14", referred to above, as the vehicle for its work.

5. UNIVERSITY OF LEICESTER – Master of Educational Studies

This new degree course starting in October 1977 has been designed to provide teachers and administrators with an opportunity to extend their professional education at an advanced level.

Students may take a one-year full-time or two year part-time course and assessment will be by written examination and dissertation.

Three options must be studied, from a list which includes:

Science Education I
Science Education II
Educational Assessment and Evaluation
Primary Education I – Curriculum Studies in Primary and Middle Schools
Primary Education II – Socialisation in the Primary School
Structure and Process in Further Education.

Full details can be obtained from:

Secretary to MEd Studies Course
University of Leicester School of Education
21 University Road,
Leicester LE1 7RF.

6. PART TIME COURSE FOR CERTIFICATE OF ADVANCED PROFESSIONAL STUDIES

Bristol Polytechnic, Redland House, Bristol BS6 6UZ.

This is a one year course involving 2½ hours per week and two weekends of study time. The course aims include a study of trends in the development of science education for the 5–13 age group and particularly the contribution of science to the education of this age group including the nature of consultancy work.

The course is intended for primary and secondary teachers with a minimum of two years experience and future developments may include a course specifically designed for overseas students.

The organiser is Sheila Parker.

7. GWENT COLLEGE – Diploma course in Environmental Education

This new course, mentioned in SEN 29, continues to be available. Applications for the academic year starting October 1977 are welcomed, and should be addressed to:

The Registrar, Gwent College of Higher Education,
College Crescent, Newport, Gwent NP6 1XJ.

8. EVALUATION OF SCIENCE TEACHING METHODS – A report

Processes and products of Science Teaching – a Schools Council Research Study, edited by J F Eggleston, M J Galton and M E Jones, Publisher Macmillan, £5.75.

This is a report on the findings of the Schools Council research project for the Evaluation of Science Teaching Methods, based at the University of Leicester School of Education from 1970 to 1973 under the direction of Professor J F Kew and Professor J F Eggleston.

Originally the purpose of the project was to evaluate the teaching of Nuffield O-level science in general, to 14–16 year olds and it was intended to question teachers about their teaching methods and their objectives. The team was

concerned to identify the processes of science teaching, and then to investigate possible relationships between such teaching methods and their products.

In order to obtain an objective view of these processes the project developed the Science Teaching Observation Schedule (described in an earlier Schools Council research study), which was then used to observe a sample of more than 100 teachers in the course of 300–400 science lessons. Three contrasting teaching styles were identified:

Style I: teacher holds the initiative, and challenges his pupils with questions; science is seen as a problem-solving activity.

Style II: teacher uses questions relatively infrequently, but there is a fairly high incidence of teachers' statements of fact; learning tends to be non-practical and fact-acquiring.

Style III: higher level of pupil participation; pupils often initiate enquiries, and teacher asks fewer questions.

Differences were found in the use of these styles across the three disciplines.

The attainments and attitudes of pupils taught by these three styles were compared, and the picture which emerged indicated that styles I and III were preferable to style II. Style II was the most popular in biology, while in chemistry it tended to be used for the most able pupils; as the authors point out, this indicates that some radical thinking about teaching methods is necessary. Another significant finding was that style III seems to work better with poorly motivated students than style I.

The authors feel that a major outcome of their research is the contribution of a new methodological approach to curriculum evaluation. Since both attainment differences and attitude changes can be attributed to teaching style, teacher-pupil interaction must be included in evaluation studies.

9. JOURNAL OF BIOLOGICAL EDUCATION

In December 1976 this journal celebrated its tenth anniversary. It has strong international links, publishing papers from many parts of the world; the October 1976 issue, for example, includes papers from Hong Kong, West Germany and the USA.

The Journal covers primarily topics of interest to those teaching at upper secondary and higher levels, with articles written by practising teachers, news and comments, letters and reviews of books, equipment and visual aids. A particular feature of the Journal has always been its coverage of new developments in biological education.

Although the Journal has been published six times a year in the past, it is changing to quarterly publication from the beginning of 1977, but the enlarged Journal will contain the same total number of pages.

The formation, in December 1976, by the Institute of Biology, of an Education Division is likely to help promote the future development of the Journal, and thereby that of biological education generally.

Subscription rates:

UK and all countries except USA and Australasia £12.00 per annum (postage included)
USA and Australasia $US35.00.

The Journal is obtainable from:

JBE Subscriptions Department
Institute of Biology
41 Queen's Gate
London SW7 5HU.

10. NEWS FROM CLEAPSE (The Consortium of Local Education Authorities for the Provision of Science Equipment)

The CLEAPSE Development Group not only produces reports on equipment but will answer particular enquiries about choice or supply of equipment.

Individual visitors and groups are welcome to visit the Centre on Saturday mornings by arrangement.

In their termly bulletin, the new ideas about the relative dangers inherent in the use of asbestos are summarised as follows:

a. The use of Crocidolite is banned.

b. The use of Chrysotile is allowed when precautions to prevent inhalation are taken.

c. Other recommendations are: for asbestos wool use mineral wool substitute; use hard asbestos mats, if they are really necessary; wire gauzes with asbestos centres should be replaced by stainless steel gauzes; find alternatives to asbestos-containing fillers, asbestos tape and paper and asbestos cement bench tops.

New documents from the Centre:

Electrical Safety and the users of School Laboratories.

Solar Panels – Flat collector plates for solar heating.

Newton meters – Spring balances.

Middle Schools science kits.

11. MATHEMATICS TEACHER EDUCATION PROJECT (MTEP) (see SEN 27.11 and 29.12)

MTEP was established in 1974 with a grant from the Nuffield Foundation, and is based at the Department of Education, University of Leeds. The Project Directors are G T Wain, Centre for Studies in Science Education, University of Leeds; and Dr D Woodrow, City of Manchester College of Education.

The aim of the project is to develop approaches for the training of mathematicians to teach in secondary schools, and to provide activities and resources for use by tutors concerned with the organisation of students' work.

Seven areas of special interest have been defined, and working groups of writers have produced units outlining a wide variety of student activities. Following trials, the units are being revised by the Project Editor in charge of each interest area.

The materials which have been developed are to be published late in 1977 as two items: a tutor's book and a student's resource bank. Both will be divided into seven sections, whose titles and principal authors are given below:

Mathematical Awareness
W S Wynne Willson, School of Education, University of Birmingham

Children Thinking
F R Watson, Institute of Education, University of Keele

Teaching Styles
C Winter, Department of Education, Brunel University

Mathematics and Other Subjects
Mrs M E Brown, Centre for Science Education, Chelsea College, University of London

Resources
P Reynolds, Doncaster College of Education

Topics to be Taught to Graduates
C P Mears, Padgate College of Education

Teaching Particular Groups of Children
K E Selkirk, Department of Education, University of Nottingham.

The tutor's book provides practical suggestions for a comprehensive range of activities which may be undertaken with students. These include tutor-led discussions, the exploration of teaching resources, the analysis of video-tapes, and private study using information and discussion papers. Emphasis throughout is on relevance to classroom practice, this being particularly important in the sections dealing with approaches to mathematics teaching, mixed-ability classes, and psychological aspects of learning. References for further reading and lists of resources available to extend the work are other important elements.

One of the resources referred to throughout the tutor's book is a student's manual. This contains discussion papers to be used in conjunction with the tutor's book; self-teaching material to help the student towards an understanding of such areas as the role of numerical analysis in school mathematics, the scale-factor approach to differentiation etc; and charts, tables, lists and diagrams to complement items described in the tutor's book. All the material in the student's manual is designed to be used as hand-outs.

Further information is available from:

Centre for Studies in Science Education,
Department of Education,
University of Leeds LS2 9JT.

The books will be published in late 1977 by:

Blackie & Son Limited,
Bishopbriggs,
Glasgow G64 2NZ.

12. PROJECT ON STATISTICAL EDUCATION (SEN 30.9)

Further details of this project are now available, and the second Newsletter (Summer 1976) has been issued.

Two main reasons for undertaking curriculum development work in statistics are, firstly, the evident desire for more support shown by a large number of teachers of statistics, and secondly the fact that there has been dissatisfaction among professional statisticians about the type of statistics taught in schools.

There is a need for a balanced approach to the subject to be developed which will not only give due weight to mathematical techniques, but also lay appropriate emphasis on the practical background of statistical investigations. At present, it is felt, school courses have a tendency to neglect practical application and do not recognise sufficiently the links which the subject has with disciplines such as biology, geography, physics and the social sciences. Statistical ideas should be seen as a thread running through many subjects that are traditionally timetabled separately.

At present, most school work in statistics is probably done in the sixth form, but it is increasingly being recognised that some statistical appreciation is needed by all citizens; statistical ideas should, therefore, be introduced at many levels, and part of the project's aim is to work towards achieving this.

The aims of the project are:

1. to assess the present situation in statistical education as regards content, level, motivation and teachers' attitudes, and relate these to the position of statistics outside schools;

2. to survey the needs of teachers, whether they are teaching statistics as a specialist subject or working in a related field; implications for both initial and in-service training need to be considered;

3. to devise detailed proposals for implementation of the teaching ideas;

4. to produce teaching materials such as notes for teachers, descriptions of experiments, workcards, sets of examples, transparencies and audio-visual aids.

Ten project papers have been published, as follows:

1. P1 Report on the survey of statistics teaching in schools.
2. P2 Statistics in primary schools.
3. P3 Statistics in mathematics courses.
4. P4 Statistics in humanities courses.
5. P5 Statistics in science courses.
6. P6 References for teaching statistics.
7. P7 Equipment, the media and other resources.
8. P8 In-service and other courses for statistics teaching.
9. P9 Statistics in GCE 'O' level syllabuses.
10. P10 Statistics in CSE syllabuses.

These papers are available from the project secretary at a cost of 10p each, the money to be sent with the order.

The project is also producing pupils' materials in the form of units of work each designed to take about five lessons to teach. These are at present being field-tested in 30+ schools. The project also plans to produce materials for teachers in due course.

The project office is Schools Council Project on Statistical Education, Department of Probability and Statistics, The University, Sheffield, S10 2TN.

13. DIME PROJECTS (Developments in Mathematics Education) (SEN 24.11.6)

DIME Projects was established in the Department of Education, University of Stirling, Scotland, to enable new material and equipment for mathematics teaching to be developed for use in schools. The main emphasis is on ways of working in which the children are actively involved. The material is intended to be attractive, interesting and stimulating, and suitable for a wide range of ability. It is not based on any particular syllabus, but is meant as an additional resource for teachers to incorporate in their teaching strategies.

Two particular recent developments are Shape Tiles, and a Probability Kit. Both these are at present in the final stages of development and will be available shortly through Oliver and Boyd. The Probability Kit consists of a set of "Shakers" which are specially designed for use in lower secondary and top primary classes. 30 carefully chosen experiments and an imaginati( ) new way of recording results make this kit very attractive.

A catalogue of booklets and materials available is obtainable, together with order forms, from:

The Secretary
DIME Projects
University of Stirling
Stirling FK9 4LA
Scotland.

The Director of DIME is Mr G Giles.

14. THE ASSOCIATION OF TEACHERS OF MATHEMATICS, ANNUAL CONFERENCE, 12–16 April 1977

The Association of Teachers of Mathematics will hold its Annual Conference at Trent Polytechnic, Clifton, Nottingham, from Tuesday 12 – Saturday 16 April 1977.

The Conference includes three major lectures but is basically organised through a series of working groups and seminars. Participants will select both an Age-Range group and a Seminar group.

The Age-Range groups available are:

5–11 years: mathematical activity in the primary school – taking stock

11–16 Arithmetic

11–16 Investigations

16–19 Sixth Form Mathematics Within the Context of a Five Subject Curriculum.

The Seminars available are:

Mathematics in Mixed Ability Groups

Practice, theory and some recent research in mathematical education

Tessellations – problems and proof

Another look at some teaching topics

Film making

CSE Course work and Assessment

Early Mathematical Experiences

Pocket Calculators

Multiples

A lot from a little.

Further information and application forms are available from:

The Executive Office
ATM
Market Street Chambers
Nelson
Lancashire BB9 7LN

15. MATHEMATICAL ASSOCIATION, Annual Conference, 13–16 April 1977

The Annual Conference of the Mathematical Association will be held at the University of Liverpool from Wednesday 13 – Saturday 16 April 1977.

The Conference will include the Presidential Address and other presentations on aspects of mathematics and mathematics education. In addition there will be working groups on the following topics:

The N and F proposals
Groups – working and others
Low ability pupils and problems of communication
Mathematics and Teachers' Centres
Proper accommodation and equipment for a mathematics department
Aims and objectives of mathematics teaching
Mathematics in TEC/BEC courses
Mixed ability groups in mathematics

Further information and application forms are available from: The Secretary, Mathematical Association, 259 London Road, Leicester LE2 3BE.

16. PUBLICATIONS

16.1 The Architecture and Properties of Matter

Scientific Educational Aids, 104 Hercies Road, Uxbridge, Middlesex (Director: Dr M B Ormerod) have produced a package of audio-visual aids designed to help students at the upper secondary level to understand the structural aspects of chemistry and its relationship to properties.

The various materials available include PEEL models* available from A Gallenkamp and Company Limited or Messrs Griffin and George Limited; filmstrips or slides available from Scientific Educational Aids; a cassette commentary on the filmstrips or slides available from Scientific Educational Aids; and a teacher's handbook entitled 'The Architecture and Properties of Matter – An Approach through Models' published by Edward Arnold Limited and available from Scientific Educational Aids or from the publishers or manufacturers.

The series of filmstrips at the Advanced level is in seven parts but there is also a series in two parts at the more elementary level (GCE 'O'/'A' level standard). The whole range of filmstrips (nine in total) comprise more than 400 frames and is intended to be used at intervals during the school chemistry course after relevant experimental work has been done. The cassettes to accompany the elementary level filmstrips (in two parts) represent about 160 minutes' playing time.

Full details of the titles and cost of the various parts of this package can be obtained from Scientific Educational Aids. The filmstrips and the book were reviewed in 'Education in Chemistry' in September and May 1972 respectively. A German translation of the book has more recently been issued.

The flexibility of this multi-media package with the possibilities of using other languages on the cassettes (subject to the usual copyright regulations) will appeal to all those involved in the teaching of chemistry at the upper secondary or undergraduate level.

* PEEL is Probability Envelope of Electron Location.

16.2 **Mathematics for general education.** Pupils work books, worksheets, etc and teachers notes. MacMillan Education.

This set of material represents an important new non-public-examination scheme for pupils in their final 2 years of secondary school (ages roughly 15 and 16). It has developed from work undertaken in Scotland, coordinated by the Scottish Centre for Mathematics, Science and Technical Education. The material consists of separate units of work each occupying between 1 and 8 periods. The whole set of material is designed to enable the teacher to select units to make up his own course. Most of the units are concerned with arithmetic and are related to the environment.

16.3 **Towards Mathematics.** David Sturgess and John Glenn; Schofield and Sims; 1976.

This new set of materials provides a basic core of mathematical experience for children in the age range 7–12. The material allows the teacher considerable freedom to choose the order in which topics are presented and th thus allows the work to be geared to the ability of each child.

The materials are arranged in five Sets each containing ten copies of each of five 16-page Core Units. A Set has associated with it seventy Work Cards; a Teacher's Handbook containing comments and answers; a Children's Answer Book; a Handbook for the Work Cards containing answers and comments; forty Children's Record Cards.

The work in the Core Units has been so arranged that, except in a few cases (noted in the Handbook), the Units can be used independently of one another.

The additional work provided by the Work Cards is optional and it is left entirely to the discretion of the teacher as to whether or not children work a particular card. The Cards themselves are clearly printed and durable.

Every attempt has been made to keep the language used in Towards Mathematics as simple as possible. Technical words are always introduced where appropriate, but in such a way that the meaning is apparent from the context.

In addition to the materials for classroom use there is a Teacher's Manual, "A Primary Teacher's Guide: Towards Mathematics". The Manual contains a full discussion of the mathematical ideas underlying the work in the units as well as a detailed description of all the various teaching points raised by the material. These discussions are in considerably more detail than the notes contained in the Teacher's Handbook. The Teacher's Manual is a full discussion of the problems of teaching primary mathematics and can be read either alongside or independently of the Project.

The materials are available in five Sets, each Set containing:

10 Copies of each of five Core Units* (fifty Core Units in all, per Set)
A Teacher's Handbook to the Core Units
A Pupils' Answer Book
70 Work Cards
A Handbook to the Work Cards
40 Record Cards

*Set One contains Core Units 1–5
Set Two, Core Units 6–10
Set Three, Core Units 11–15
Set Four, Core Units 16–20
Set Five, Core Units 21–25

Towards Mathematics	Set One	(7217 2164 8)	£17.50
Towards Mathematics	Set Two	(7217 2176 1)	£17.50
Towards Mathematics	Set Three	(7217 2183 5)	£17.50
Towards Mathematics	Set Four	(7217 2200 8)	£17.50
Towards Mathematics	Set Five	(7217 2212 1)	£17.50

In preparation
A Primary Teacher's Guide: Towards Mathematics (7217 2224 5) £2.75

Replacement items available:

1 each of Core Units 1–5	banded together	(7217 2175 3)	£1.25
1 each of Core Units 6–10	banded together	(7217 2187 7)	£1.25
1 each of Core Units 11–15	banded together	(7217 2199 0)	£1.25
1 each of Core Units 16–20	banded together	(7217 2211 3)	£1.25
1 each of Core Units 21–25	banded together	(7217 2223 7)	£1.25

20 Record Cards	Set One	(7217 2174 5)	55p
20 Record Cards	Set Two	(7217 2186 9)	55p
20 Record Cards	Set Three	(7217 2198 2)	55p
20 Record Cards	Set Four	(7217 2210 5)	55p
20 Record Cards	Set Five	(7217 2222 9)	55p

16.4 Heinemann Experimental Chemistry

No 4. Transition Elements – Chemistry. Student text price £1.25, teacher's guide price £1.90 by J N King and E McManus.

Previous books in the series have dealt with structure, equilibrium and kinetics, electro-chemistry, chemical analysis, chromatography and ion exchange.

The present book of 75 pages in all, is recommended by the authors for the use of 'A' level and scholarship students; it would also find a further application in undergraduate chemistry courses overseas.

The practical exercises are described in stages, with full practical instructions, and details of the equipment which is required. When the results have been achieved, a series of questions are posed, to complete an enquiry sequence.

The sections treated include, the first transition element series, variable oxidation states, complex ions, colour and transition element compounds, catalytic activity of the transition elements, magnetic properties of transition element compounds.

Each section begins with a discussion which orientates the student towards the subsequent practical exercises and provides a useful summary of the required theoretical background. The various sections can be studied in any order.

The teacher's guide which accompanies the student manual is invaluable for the inexperienced teacher, by virtue of the explanations given about the rationale of the student exercises and the discussion of the practical out-comes which will be encountered. There are also numerous references to further reading.

16.5 **Starting Points in Physical Science.** By S E King, published by Hart-Davis Educational. 216 pages. Price £4.50.

The style of this source book is well orientated towards the practical needs of the junior science teacher; it has sections dealing with light, colour, electricity, crystals, heat, chemistry, sound, measuring, air, water, buildings and movement. There are in addition book lists and names of British suppliers of materials for constructing the equipment.

The main strength of the book is in its provision of clear detail, with line drawings, of models and equipment which the teacher can construct himself with minimal facilities. Therefore the book will be useful in all junior science teacher training situations.

The book has a strong ring binding enabling the detachment of sheets for use by individual groups of workers etc.

16.6 **Safety in Science Laboratories,** Department of Education and Science booklet.

The **second edition** of this booklet has recently been issued. It follows the format of its predecessor, but there are a number of alterations.

Chemical hazards are emphasized, in particular the necessity of wearing goggles whenever any operation with chemicals is performed.

There is new advice on the disposal of bacteriological and fungal cultures, and on the use (or non-use) of asbestos.

The price of the booklet is 85p.

16.7 **Structured Questions in Physics** by J M Wilson and J R Muckersie. pp 150 with answers. Published by Heinemann. £1.25.

This book contains chapters of structured questions dealing with the conventional divisions of the O-level Physics syllabus, with a section on Modern Physics and experimental methods.

The questions in a particular section are graded to include a variety of cognitive behaviours from association recall to less structured problem solving. There are many practical considerations illustrated with drawings and photographs; and there are useful homework exercises, it is suitable for high ability O-level streams.

16.8 **What is Energy?** By A W Wilson, published by Wheaton. pp 69.

This book contains chapters dealing with the concept of energy, the physics of energy, chemical energy and life, thermodynamics, conversion, transmission and storage of energy.

The book also contains useful suggestions for further reading, a list of references and suggestions for projects.

The complexity of the chapters is variable but the book is broadly of interest to A-level chemistry and physics students requiring background reading and a modern conceptional treatment. Overseas teachers will be interested in the latter resource and the book has a place in the sixth form library.

16.9 **Certificate Chemistry – Multiple Choice Questions.** By M M L Oblitas, published by Heinemann. pp 89. £0.70.

Chapters of questions deal with main O-level topics and there are three mixed test papers; answers are given.

The questions test a range of understanding, as well as plain factual recall. It would be useful for teachers interested in item analysis, although a breakdown of the behaviours tested is not given.

Suitable for O-level students.

OVERSEAS ACTIVITIES

17. CARIBBEAN

17.1 Jamaica: Science Education Centre

The Science Education Centre, based in the Physics Department of the University of the West Indies, Jamaica, began life just over 10 years ago.

As the Physics and Mathematics Centre, set up in 1966, its main functions were to loan equipment, films and books to teachers; assist in conducting courses for teachers; advise schools on apparatus, its purchase, repair and suitability for the various courses offered at schools; develop programmes and to run pilot projects.

Since 1969, when the Science Education Project was launched, the Centre has become deeply involved in developing curricula for high schools, in administering the Northern Sector of the Caribbean Regional Science Project and the UNESCO/UWI/UNICEF RLA 142 Teacher Training Project.

Regional Science Centres have been established by the Project at Schools or Colleges in Montego Bay, Brown's Town, Mandeville and Butt Bay. Equipment in these centres came mainly from UNESCO gift coupons.

The academic staff of the centre comprises at present four Fellows, in the fields of Biology and Evaluation, Chemistry, Integrated Science and Physics (the latter provided by the British Council under the Aid to Commonwealth Teaching of Science scheme). It is hoped that two additional Fellows for Primary Science education will join the team in 1977.

The main functions of the centre at present are:

1. In-service education, both formal and informal: regular briefing for the curriculum projects, casual advice, the bi-monthly Newsletter, and loan of materials.

2. providing a consultation service to schools, higher education institutions, and the Ministry of Education.

3. research in science education and curriculum development.

4. producing instructional materials for curriculum development projects and short courses.

5. maintaining a library of resource materials.

6. evaluation of school and RLA 142 Teacher Training materials.

7. guidance in the field of assessment, for the grade 10–11 curriculum project of the Ministry of Education.

8. communications with Science Teacher Associations.

Future plans include a possible move to a new building, and involvement with the Primary Science Project of the Ministry of Education.

This note is abridged from a feature article in volume 8, no 1 of the bi-monthly Science Education Centre Newsletter.

17.2 Mathematical Associations in the West Indies

There are active professional associations of mathematics teachers in Jamaica, in Trinidad and Tobago, and in Barbados. The Barbados Mathematics Association has recently issued Number 3 in its series of Journals, dated September 1976. The Journal is published twice yearly, in September and April, at a cost of 75c (B). The Editor is Miss Marlene Folkes, 2H Rock Avenue, Wildey, St Michael, Barbados.

17.3 Caribbean Mathematics Project (SEN 30.15.2)

The second issue of "Mathematics News: Caribbean Mathematics Project Bulletin", No 2, Vol 1, July 1976, is now available from the School of Education of the University of the West Indies, Cave Hill, P O Box 64, Bridgetown, Barbados.

17.4 New World Science. By Judith Reay and A D Turner, Longman Caribbean

This new course in integrated science at lower secondary level is based on the University of the West Indies **Mona Project** (see SEN 30.15), in Jamaica, but it is suitable for use throughout the Caribbean.

The course uses local materials, and is based on a practical approach to real problems.

Judith Reay is Senior Lecturer in Science Education, UWI, in Augustine, Trinidad.

A D Turner was formerly Research Fellow, Science Education Project, UWI Jamaica (now Lecturer in Integrated Science, London Institute of Education).

Pupils Books 1 and 2 – £1.20 each
Teachers' Guides 1 and 2 – £2.50 each.

18. THE DEVELOPMENT OF SCIENCE TEACHER ASSOCIATIONS IN MALAYSIA

The Registrar of Societies in Malaysia approved the registration of the Persatuan Pendidikan Sains dan Hisab Malaysia (Malaysian Association for Science & Mathematics Education) and its Constitution on 17 August 1976. The official address of the Association is c/o Ministry of Education, Federal House, Kuala Lumpur 01-34, Malaysia.

The act of registration was the culmination of considerable activity at all levels throughout Malaysia over the preceding years, and was a welcome step in Malaysia's overall effort to improve the teaching of science and mathematics in the schools and training colleges. Up until January 1974 two Malaysian States had legally constituted associations. One of these, the Association for Science & Mathematics Education in the State of Penang is now ten years old and is probably the most developed of the State associations. Since 1974 nearly all of the remaining States in Malaysia have registered Associations, and these are at various stages of development.

Some of the States are small, and there are many activities undertaken by these State associations that are common to all, making desirable some kind of coordination from above; it was with this kind of thinking in mind that the setting up of a national association was proposed. In February 1974, educationists from all over Malaysia met for three days in Penang to discuss and formulate the kind of association required. The seminar proceedings ranged from learning about the functioning of other countries associations to drafting a Constitution for the proposed Malaysian organisation; from the desirability of forming such associations to their role and the nature of their activities. Since then, the time has been spent on producing a Constitution acceptable not only to the participants of the seminar but also one in concord with national educational policies. It is therefore with satisfaction that the National Association is now officially registered and can begin to function as the parent body to the State Associations. And through the Science and Mathematics teachers all can continue to work in the interests of science and mathematics education in Malaysia.

The pro-tem Council of the Association is as follows:

President:	Mr Kum Boo
Vice President:	(a) Tuan Haji Mohd Ali Ibrahim (b) Professor Sim Wong Kooi
Hon. Secretary:	Mr Mohd Ali Abdul Razak
Hon. Asst. Secretary:	Mr Wahidullah Khan
Hon. Treasurer:	Mr K Rajendram
Hon. Editor:	Mr Chang Kwai

19. FILMSTRIPS OF PRIMARY TEACHING PROJECTS IN AFRICA

Three filmstrips have recently produced by the Department of Education in Developing Countries, Institute of Education, University of London. They are:

19.1 **Approaches to Lower Primary Teaching in Nigeria** (35 mm colour, 34 frames)

This filmstrip was prepared by B L Young and H W R Hawes, both of whom were formerly staff members of the Institute of Education, Ahmadu Bello University, Zaria. It shows schools involved in the UNICEF/UNESCO Curriculum project for primary schools. Its particular value lies in its illustration of the use of the local environment and its resources.

The initial scenes show the appropriate organisation of the class both indoors and outdoors, and the use of scrap paper, matches and match boxes in art, science and mathematics. Modelling with plant materials, and clay and water play are also mentioned, and this leads to a short sequence about language.

Important aspects are the close observation of science and mathematics teaching situations and the emphasis on creative activities, especially games and physical education in groups.

The filmstrip is an ideal medium for primary teacher training, and not only in Africa: as a record of activity strategies for the primary teacher it has wider relevance.

19.2 A Science Project for Primary Schools in the North of Nigeria (35 mm colour, 36 frames)

This filmstrip, prepared by B L Young, gives more detail of the science activities in primary schools developed by the UNICEF/UNESCO curriculum project at Ahmadu Bello University, Zaria.

Curriculum guidelines stressed the "processes" or intellectual skills of the scientist, which were to be at the core of a primary science curricular project developed in Nigeria. Most of the photographs show how this philosophy – the teaching of skills such as observation, classification, experimentation and so on – was translated into practical action in the classroom.

The last eight photographs show how one teacher handled a lesson, "sink and float", suggested in the teacher's guide of the science project.

19.3 A School Garden in Lesotho (35 mm colour, 34 frames)

This filmstrip is essentially concerned with the way in which a 2½ acre garden was organised to produce food for a 600 pupil primary school in Lesotho. The materials have an additional interest in showing how the established garden and its produce can be used as a vehicle for teaching students in the areas of language, science and mathematics, practical studies and social studies.

For example, the garden work gives teacher and pupils plenty to talk about and the measuring and counting which take place have obvious applications. A lesson about the biology of insects is shown, and the various skills required in planting, mulching and watering.

The film strip has value as a resource in rural teacher training and environmental curriculum development as well as the more direct application to agricultural training.

Filmstrips 1 and 3 are available, price £3 each with notes, from:

H W R Hawes
Department of Education in Developing Countries
Institute of Education
Malet Street
London WC1

Filmstrip 2 is available, price £2.50 with notes, from.

Science and Mathematics Education Unit
The British Council
10 Spring Gardens
London SW1A 2BN.

20. INDIA

CBSE/CAMET Mathematics Project

This project started in late 1972 as a collaborative venture between the Central Board of Secondary Education, New Delhi, and the Centre for the Advancement of Mathematics in Education and Technology, Loughborough University, UK. The Project is developing teaching material written to a modernised mathematics syllabus for Grades IX to XII in those schools in India for which the CBSE caters. The books are being written by small groups of teachers during periods of attachment to CAMET, under the direction of Professor A C Bajpai, Director of CAMET.

The first book has now been published, for Grades IX and X, under the title Secondary School Mathematics: CBSE-CAMET Project. It is a substantial volume of 300 pages, and is priced at 10 Rupees. The address of the publishers is Central Board of Secondary Education, 17-B, Indraprastha Estate, New Delhi, India.

INTERNATIONAL ACTIVITIES

21. SCIENCE EDUCATION PROJECT FOR AFRICA (SEPA) – Representatives' Council Meeting, Nairobi 18–23 August 1976

Mr S Moss (British Council, Kenya) attended the meeting as an observer, together with representatives from Gambia, Ghana, Kenya, Liberia, Nigeria, Sierra Leone, Swaziland, Uganda the EDC and USAID agencies.

Professor N H Cole (Sierra Leone) delivered a Keynote address from the chair, at the beginning of the meeting, which stressed the need for unification to implement science education throughout Africa more efficiently.

In the past, SEPA has striven to produce suitable teaching materials in primary science, to provide for suitable teacher training, and has initiated evaluation studies. Now, there is a need to strengthen the central SEPA Secretariat to disseminate information about science education, particularly into the francophone countries.

Other activities at the meeting revealed that the SEPA primary science materials are used on a significant scale in Kenya, Nigeria and Sierra Leone and that teacher training at Njala University, Sierra Leone may soon start to provide diploma and master's degree courses; a materials development programme is also envisaged.

The International Centre for Educational Evaluation has come to reside at the University of Ibadan (Nigeria); a current course describing techniques in data collection continues the active interest in evaluation techniques and studies.

New SEPA officers were elected at the meeting as follows,

Chairmen	Mr Y Y Okot	(Uganda)
	Mr E M Mugiri	(Kenya)
W African Representatives	Miss M Tawia	(Ghana)
	Chief Rex Agiobu Kemmer	(Nigeria)
E African Representatives	Mr E M Mugiri	(Kenya)
	Mr Ate Ahmed Karrar	(Ethiopia)
Central and South African Representatives	Mr S Thelejone	(Lesotho)
	Mr M Chitordo	(Zambia)

22. SCIENCE EDUCATION RESEARCH IN EUROPE – A Report on the Council of Europe Workshop, Malente, Federal Republic Germany, October 26–29, 1976.

The Workshop was organised by the IPN (Institut fur Padagogik der Naturwissenschaften) at Kiel for the Council of Europe, to discuss the general parameters of developing science education research in Europe. 41 delegates consisting of senior personnel from Belgium, Britain, Germany, France, Italy, Netherlands, Spain, Norway, Sweden, Switzerland, Finland, Iceland, Denmark and Luxembourg prepared working papers describing the present status of their work and these were discussed at the conference in working groups, to produce recommendations for future action.

The main findings were as follows:

1. To improve dissemination of research activities between European countries, by initiating a scheme of country correspondents reporting to a central commission facility.
2. The requirement for a new European science education journal was identified.
3. Additional workshops are required similar to the present activities.
4. An overriding concern to improve the training of young science education researchers was evident and this led to the formulation of a private scheme involving IPN and a small group of other European science education research centres, whereby existing aid schemes and interchanges can be organised into a common scheme of training for mutual benefit. This would later be extended in the light of these experiences, to other European countries.
5. It was decided to carry out a survey of the existing subjects for postgraduate theses and dissertations in existing European institutions.
6. The main areas of attack for future research in science education were identified and there was concern that research findings are not finding their way to the classroom level in a purposeful manner at the present time.

A fuller report of the conference discussions and the national reviews of science education research will be published in 1977.

23. LONDON INTERNATIONAL YOUTH SCIENCE FORTNIGHT

Applications are now invited from science students throughout the world to participate in the 1977 International Youth Science Fortnight, which will take place in London from 27th July to 10th August.

The Science Fortnight is an annual gathering of about 300 students from Britain and from many other parts of the world. The participants, aged about 16 to 22 years, stay in student hostels, and join in:

Lectures and demonstrations by outstanding scientists on their work and ideas, and on the importance of science in solving the world's problems.

Seminars and discussions on current developments in science.

Visits to research establishments, university departments and industrial plant.

Reports on students' own researches.

Film shows, sightseeing, social activities.

The aim of the Science Fortnight, organised by the Council for International Contact, is to foster international friendship through a shared interest in science and its application to modern problems.

The cost of participation is about £115, including VAT; this covers all London expenses except pocket money. Many students are able to obtain sponsorship, for the whole or for part of the cost, from their local education authority, from industry, or from other sources. The language used for the conference is English, and all participants should have a good working knowledge of English.

Full information and application forms can be obtained from:

Council for International Contact,
P O Box 818
179–183 Fulham Palace Road
London W6 8QU.

24. INTERNATIONAL CONFERENCE ON CHEMICAL EDUCATION, UNIVERSITY OF LJUBLJANA, YUGOSLAVIA, 25–30 August 1977

The theme of this Conference is "Chemical Education in the Coming Decades: Problems and Challenges". Its objectives are:

A. To define the major current problems and to consider the future of chemical education in the context of:

1. the changing needs and demands of society,
2. the developing nature and scope of chemical sciences,
3. students aspirations and attitudes,
4. the demands of developing countries.

B. To prepare recommendations for the future of chemical education at all levels.

The programme will be based on nine sessions each including an introductory presentation related to the objectives, followed by group discussions which will allow full involvement of all participants. It will be of interest to those concerned with the teaching of chemistry at elementary, secondary and higher levels.

The Conference is organised by:

International Union of Pure and Applied Chemistry

University of Ljubljana

Union of Yugoslav Chemical Societies

UNESCO

Further information may be obtained from:

The University of Ljubljana
Department of Chemistry – RCPU
P O Box 18/1
61001 Ljubljana, Yugoslavia.

5. The International Conference will be followed by a two day meeting of the Federation of European Chemical Societies (FECS) Committee on Chemical Education, on aspects of European chemical education.

25. EUROPEAN CONFERENCE ON ENVIRONMENTAL EDUCATION: Environment and Society – Educational Priorities, London, April 26–28, 1977

This conference, organised by the Institution of Environmental Sciences and Farnborough College of Technology, will examine issues in environmental education in schools, colleges and universities and in the community at large.

More than 30 papers will be presented, by speakers from EEC countries, Australia, Canada, Israel, Nigeria and the United States. The programme will be divided into 4 sections:

Community Education
Formal Education
Interdisciplinary Approaches
What next in Environmental Education?

The conference fee of £50 includes a copy of the Conference proceedings, to be published by Pergamon Press.

Further details, and registration forms may be obtained from:

David Hughes-Evans
Conference Coordinator, Environment and Society,
Farnborough College of Technology
Boundary Road
Farnborough, Hants, UK.

26. INTERNATIONAL CONFERENCE: INTEGRATED SCIENCE EDUCATION WORLDWIDE

An International Conference on Integrated Science Education – Achievements and Prospects – will be held in March/April 1978 in the Netherlands, organised by the International Council of Associations for Science Education (ICASE), and the Committee on the Teaching of Science of the International Council of Scientific Unions (ICSU).

The aim of the Conference is to study the scientific and educational reasons for the development of integrated science education at various levels in the educational system of the world; to review, by case studies, examples of integrated science education developed during the last ten years; to consider future developments in integrated science education especially in relation to environmental science education, technological studies, health, nutrition and agricultural education and social relevance; and to prepare materials suitable for publication in the series of UNESCO New Trends in Integrated Science Teaching publications.

The Conference is being held in Nijmegen, Netherlands, and will run from 28 March to 7 April 1978. Local arrangements for the Conference will be in the hands of the Association for Science Education in the Netherlands (NVON) and from the office of NVON, Pieter Borstraat 22, Amsterdam 18 further information may be obtained, including copies of the registration leaflets. Further details will also appear in future issues of SEN.

27. EUROPEAN STUDY GROUP: ALTERNATIVE MATHEMATICS (SEN 30.17)

The third meeting of this Group took place in Villingen, Federal Republic of Germany, from August 13–15, 1976, immediately preceding the Third International Congress on Mathematical Education (3rd ICME). France, the Federal Republic of Germany, Sweden and Britain were represented.

The Group is continuing its work of constructing a problem-solving theory to provide a basis for mathematical education at secondary level. The next meeting of the Group is planned to take place in London, 15–17 April 1977.

28. ASIAN ASSOCIATION FOR BIOLOGY EDUCATION – 7th BIENNIAL CONFERENCE

The 7th Biennial Conference of the Asian Association for Biology Education will take place in Malaysia in 1978. The theme of the meeting will be 'Interdisciplinary Biology Education for Community Development'.

Further details will be available from Dr Cheong Siew-Yoong, Faculty of Education, University of Malaya, Kuala Lumpa.

29. THE EIGHTEENTH INTERNATIONAL MATHEMATICAL OLYMPIAD

The International Mathematical Olympiad is an annual event involving secondary school students in an international team competition. Each participating country may enter a team of up to eight, whose scores are added to give the national total.

The eighteenth IMO took place in Lienz, Austria, in July 1976. The competition consists of three questions which have to be tackled in a 4-hour session on one day, followed by three more in a similar session on the following day. The team competition was won by the Soviet Union, with a total of 250 points. Britain came second with 214 points, and USA third with 188. Bulgaria was fourth, and the host country, Austria, fifth, followed by France, Hungary, East Germany and Poland. Altogether 19 countries participated; USA, Vietnam and Cuba were the only ones from outside Europe.

There were two outstanding individual performances. A French competitor was the only one to obtain full marks, while the inter[illegible] awarded a special prize for a solution of outstanding merit to one of the questions, produced by a [illegible]or (J R Rickard, City of London School).

The flavou[illegible]haps be conveyed by one of the questions from the 1976 competition:

Dete[illegible], the largest number which is the product of positive integers whose sum is 1976.